

Remarks:

This amendment is submitted in an earnest effort to advance this case to issue without delay.

The specification has been amended to eliminate some minor obvious errors. In addition a new US-style Abstract has been submitted. No new matter whatsoever has been added.

The claims have been rewritten to overcome the §112 problems and to define the invention with clarity over the applied art. The claims now clearly define how the tool is "recessed" in the counterbeam and has a downstream face upstream of a downstream side of the counterbeam. This is a structure suggested by nothing in the art.

It is important to note that the instant invention is a method of making extruded curved workpieces, typically made of relatively malleable metals like aluminum. This is done by forcing a hot billet of the metal through a die so that a profiled strand issues from a downstream face of the die. Then, to make the desired curved shape, a transverse external force is applied to the still hot strand to bend it. Clearly the hotter the workpiece is, the easier it is to do this bending. This is done according to the invention by recessing the die in the counterbeam so that the

external force can be applied very close to where the strand emerges from the die.

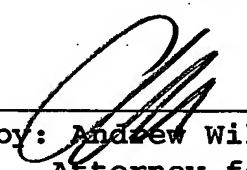
More specifically, US patent 2,954,121 of Benson shows an extrusion press where the die B or D is wholly and completely upstream of the counterbeam 7. No part of it whatsoever is recessed in the counterbeam. The strand is completely formed before it enters the counterbeam. Furthermore nothing in Benson suggests bending the strand after it exits the die, making the system of this invention irrelevant. Thus this reference is irrelevant to the instant invention. It requires the hot strand to pass completely through the counterbeam before it can be bent, but since there is no suggestion of bending it, this is not a problem.

US patent 6,634,200 of Kleiner shows a complex holder 6 in which a dies is indeed recessed, but this holder 6 is not, itself, a counterbeam nor is there anything in Kleiner to suggest that it is. If the teachings of Kleiner were applied to those of Benson, the result would be a structure where the holder 6 of Kleiner replaces the holder C of Benson and, once again, the entire system were pressed against the upstream face of the counterbeam 7. Thus Kleiner adds nothing to the teachings of Benson to anticipate the instant invention. No-one suggests recessing a die and its associated parts in a counterbeam of an extrusion press. Thus the rejections under §102 and §103 must fall.

For the reasons advanced above, all the claims in the case are clearly in condition for allowance. Notice to that effect is earnestly solicited.

If only minor problems that could be corrected by means of a telephone conference stand in the way of allowance of this case, the examiner is invited to call the undersigned to make the necessary corrections.

Respectfully submitted,  
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Enclosure:                      Corrected version of Translation  
                                    Substitute Specification  
                                    Substitute Abstract

## EXTRUSION PRESS FOR MAKING CURVED WORKPIECES

CROSS REFERENCE TO RELATED APPLICATIONS

This application is the US national phase of PCT application PCT/DE2003/002622 filed 5 August 2003 with a claim to the priority of German patent application 10236299.8 itself filed 8 August 2002.

FIELD OF THE INVENTION

The invention relates to an extrusion press or extruder ~~{extruder}~~, especially for producing curved extruded products, where ~~by the pressed product~~ in a tool arranged on a counterbeam or traverse ~~{traverse}~~ of the extruder which usually encompasses a pressure part and a die-receiving die holder, the pressed product is shaped and is then curved or bent by the effect of external forces.

BACKGROUND OF THE INVENTION

To manufacture curved or bent extruded sections or profiles ~~{profiles}~~ which are generally composed of aluminum and magnesium alloys ~~which are~~ as required for various purposes in different industrial fields, it is known from EP 0 706 843 B1 to provide an extruder for hollow products with large wall thickness differences ~~to apply that applies~~ force at least at defined distances from the die outlet or counterbeam, using a pressure medium which produces a reaction effect upon the profile or section shaped in the extruder die. The pressing means can be a pressing roller ~~[[,]]~~ or a sliding surface generating a transverse force or a roller cage. Independently of the pressure applying means which

is used to bring about the reaction force, a certain distance must be maintained if the extruded product is to be bent or curved simultaneously with or directly after shaping by the extrusion process ~~to be bent or curved~~ in such manner that the workpiece cross sections formed in the extrusion die ~~[[are]]~~ do not ~~[[to]]~~ emerge parallel to one another from the die but rather are ~~[[to]]~~ assume an angle to one another. With this arrangement it is however not possible to produce sections with small bending radii.

#### OBJECT OF THE INVENTION

It is the object of the invention, therefore, to provide an extruder for the purposes described which enables with simple means the production of a pressed product with a wide range of bending radii.

#### SUMMARY OF THE INVENTION

This object is attained, in accordance with the invention in that the entire tool is disposed in the counterbeam or traverse. In this manner, deviating from all known embodiments of extruders in which the tool or the die of the counterbeam is provided ahead or upstream of the pressing unit, the tool according to the invention can always project slightly out of the counterbeam, but predominantly, however, ~~can be~~ is received or recessed in and anchored in the counterbeam with at least a shoulder toward the side or end facing in the direction of the press ram or the receiver holding the block or blank of metal to be extruded so that the extruded strand outlet can be located as close as possible to the exterior. This ensures earlier action on the strand to be bent than has hitherto been the case so that small bending radii can be

formed thereon while the free end of the strand which is subjected to bending will undergo the bending effect after the much shorter outlet length from the die than has hitherto been the case. Depending upon the force application direction of the pressure applying means, radii in different directions are possible.

A refinement of the invention provides that the tool is provided in an enlarged pressure plate in the press direction which extends over the full length of the counterbeam. This allows compensation for a possible weakening of the pressure plate by such overdimensioning because of the recess or opening in which the integrated tool is received.

According to a preferred feature of the invention an increasingly widening outlet funnel is formed in the tool starting from the die and extending in the press direction outwardly in the press plate. In this manner not only is a free space provided to accommodate the bending or curvature of the strand but the formation of the smallest radii is further ensured because the deflection and thus the curvature of the strand can be commenced already within the counterbeam and the outlet funnel by the pressure when, in accordance with a further proposal of the invention, cylinders are arranged in the pressure plate parallel to the outlet funnel and are coupled with the tool, the entire tool can be moved out of the counterbeam rearwardly for the purpose of maintenance or replacement axially into a freely accessible position.

#### BRIEF DESCRIPTION OF THE DRAWING

Further features and details of the invention are given in the claims and the following description of an embodiment of the invention illustrated in the single drawing Figure.

#### SPECIFIC DESCRIPTION

5 In the extruder 1 shown in the drawing and illustrated in a horizontal construction, in a cylinder beam 2, a press piston 3 is arranged with which a press ram 4 can be driven in the press direction 5 (see the arrow). The ram 4 presses a block, not shown, which has previously been inserted into a receiver 7 which can be  
10 moved back and forth on slide guides 6 by means of shifting cylinders (not shown). The drawing shows the receiver 7 after it has assumed its working position adjacent [[of]] a counterbeam 8. The cylinder beam 2 and the counterbeam 8 can for example be connected by pressure posts and tension rods to a compact press  
15 frame with these elements in force-transmitting relationship with one another.

The counterbeam 8 is here provided with an enlarged pressure plate 9 which forms a component of the counterbeam 8. In the pressure plate 9 a recess or cut-out 10 is provided which  
20 receives the tool 11 here constituted by a pressure piece 12, a die holder 14 connected thereto by screws and a die 13 carried by the die holder 14. The tool 11 is thus an integrated component of the counterbeam 8 with which the end of the receiver 7 confronting it  
[[,]] forms a snug contact, thereby bringing the block to be  
25 extruded to the die without any gap between the receiver and the die.

The tool 11 and the pressure plate 9 are formed with a tool funnel 15 starting at the inner side or downstream face of the die 13 and widening outwardly downstream in the press direction 5. In the pressure plate 9 there are provided cylinders 16 parallel to the funnel 15 which are accessible without hindering from the ~~outer~~ outside ~~[[of]]~~ the counterbeam 8 and ~~[[via]]~~ coupling pieces 17 fixed to their piston rods can be coupled by detent connections formations with the tool 11 or the die holder 17. For the maintenance or replacement or the like of the counterbeam 8, the tool 11 can be displaced from the position shown in the drawing after the receiver 7 has been rearwardly shifted upstream into its inoperative position, by energization of the cylinder 16 out of the mounted position in the recess 10 of the enlarged pressure plate and opposite the press direction 5 into a freely accessible position spaced axially and forwardly upstream of the counterbeam 8.

In the pressing of a strand 18 as has been schematically illustrated, by appropriate pressure applying means indicated by the force arrow F, previously actuated, a small radius of curvature can be imparted to the strand 18. Since the tool 11 is fully housed or recessed in the counterbeam 8, this force can be applied as close to ~~the outlet of~~ where the strand 18 ~~[[from]]~~ exits the counterbeam 8 as possible and thus such that the leading end of the strand 18, that is the strand length between where the force F is applied and where it exits the die 13, before the force is applied is unusually short and the bending force is therefore applied as early as possible. It is also possible to apply this force by a



pressure-applying means arranged already within the counterbeam,  
namely ~~already at the outlet of the strand~~ within the outlet funnel  
15 of the tool 11. When the extruder 1 also is intended to make  
straight extrusions, the extrusion press operation is carried out  
5 without application of the force F.